Overlander RC-8S PRO User's Manual

A Digital Programmable Balancing Charger/Discharger/Cycler.

OVERLANDER BATTERIES
SETTING BATTERY STANDARDS... OTHERS FOLLOW

http://www.overlander.com

Contents.

	Page No.
Introduction.	**2**
Specification.	**2**
Special Features.	**2**
Charger Control and Connection Lay-out.	**4**
LiPo Battery Connection to Charger with Balancing.	**5**
Warning and Safety notes.	**5**
Programming the RC-6S.	**8**
Charging NiCd and NiMH packs.	**10**
Discharging NiCd and NiMH packs.	**11**
Cyclic operation for NiCd and NiMH packs.	**11**
Charging Lithium packs – LiPo/LiIo/LiFe.	**12**
Discharging Lithium packs – LiPo/LiIo/LiFe.	**12**
Charging Pb batteries.	**13**
Discharging Pb batteries.	**13**
Storing and loading data.	**14**
Monitoring values during a procedure.	**15**
Error and Warning Signals.	**15**
Warranty and Service.	**16**

The Overlander RC-8S PRO Programmable Balancing Charger/Discharger.

Introduction.

This unit is designed to allow the modeller to charge, discharge, and maintain a wide range of battery types and sizes. It has features which would normally be found only in much more sophisticated (and expensive) units, and will enable the modeller to maintain his/her batteries in optimum condition. It has a high power/high performance circuit intended to enable the user to maintain the very latest types and sizes of batteries. Please read this entire operating manual completely and attentively before using the unit as it covers the full range of safe procedures.

Specification.

Operating voltage range:	DC 10.0-18.0 Volt AC to DC adaptor (DC 10 -18V, 7A)
Circuit power	Max. charge power 150w Max. discharge power 25w
Charge current range:	0.1 -7.0A
Discharge current range:	0.1-5.0A
Current drain for balancing LiPo:	300mAh/cell
NiCd \NiMH battery cell count:	1 to 27 cells
LiIo\Polymer cell count:	1-8 series cells
Pb battery voltage:	2V to 36V
Weight:	410g (Net Weight)
Dimensions:	165 x 95 x 35mm

Special Features.

Optimized operating software.
The RC-8S features both a "manual" and an "auto" mode of charging/discharging. In the auto mode the unit adjusts the current during the process so as to maintain an optimum battery condition. With Lithium batteries especially, this can prevent overcharging due to user error which might otherwise lead to destruction of the pack. It can disconnect the circuit automatically and sound an alarm once any malfunction is detected. All of the programmed operations of this product are controlled via two way communication between battery and charger in order to achieve maximum safety and minimum problems. All the settings can be configured by the user.

High power functions.
The unit is designed to operate at power ratings up to 150 watts. It can charge and discharge up to 27 nickel based cells and up to 8 series lithium based cells. The high efficiency cooling system allows the unit to operate at these power levels without danger of overheating.

Internal Independent lithium battery balancer.
The RC-8S employs an individual cell-voltage balancer. The use of an external balancer is unnecessary.

Balancing individual cells during battery discharge.
During the process of discharging, RC-8S can monitor and balance each cell of the battery

individually. Error message will indicate if the voltage of any single cell is abnormal and the process will be ended automatically.

Adaptable to various types of Lithium battery.
The RC-8S is able to handle various types of Lithium batteries, such as LiIo, LiPo and the new LiFe series of batteries.

Fastcharge and storage modes for lithium batteries.
This unit has two additional charge modes, a "fast" charge to reduce the duration of charging, and a "store" charge which can control the final voltage of the battery at a level which is ideal for long-term storage and hence extend the useful life of the battery.

Maximum safety.
The automatic charge program for NiCd and NiMH packs is based on the principle of delta-peak voltage detection. When the battery voltage change on charge exceeds the pre-determined threshold, the charging process will be automatically terminated.

Automatic charge current limitation.
The maximum current upper limit can be preset for NiCd, NiMH, and LiPo packs. The unit has an Auto mode for charging all of these packs and in this mode the unit sets the charge current according to the pack assessment which the unit performs at regular periods throughout the process. In all cases the user sets the current initially (as for the Manual mode) but this is then used as an upper current limit. It is particularly useful when charging low impedance and capacity cells in the auto mode and avoids damaging the batteries by over current charging.

Capacity limit.
The charging input capacity is calculated as the process progresses from the product of the charging current multiplied by the elapsed time. If this value exceeds the pre-set limit, the process will be terminated automatically to protect the pack.

Temperature threshold.
The battery's internal chemical reaction will cause the temperature of the battery to rise during the charging process. The use of the temperature probe and the pre-set temperature limit allows the process to be terminated if this value is reached, again protecting the pack.
*This function is available by connecting an optional temperature probe.

Processing time limit.
You can also pre-set the maximum process time limit to avoid any possible defect leading to an over-running procedure and the resultant pack damage.

Input power monitoring.
If the unit is used with a lead acid battery as the power source (and not a mains power supply), the voltage of this supply battery is also monitored so that the operation of the RC-6S can be terminated if the value reaches a lower cut-off level. This prevents long term damage to the lead acid battery.

Data store/load.
The RC-8S can store up to ten sets of different operating programs. Each can be based upon different batteries types of different sizes, and can cover charging, discharging, and cycling procedures. Once stored, a program can be loaded back into the charger at the press of a few buttons so that the most regularly used procedures can be loaded and re-loaded without following the full programming process from scratch.

Cyclic charging/discharging.
1 to 5 continuous cycles of charge > discharge (or discharge > charge if preferred) are available as a program for refreshing and balancing a battery. These processes are intended to maintain/restore the battery's performance.

PC based analysis.

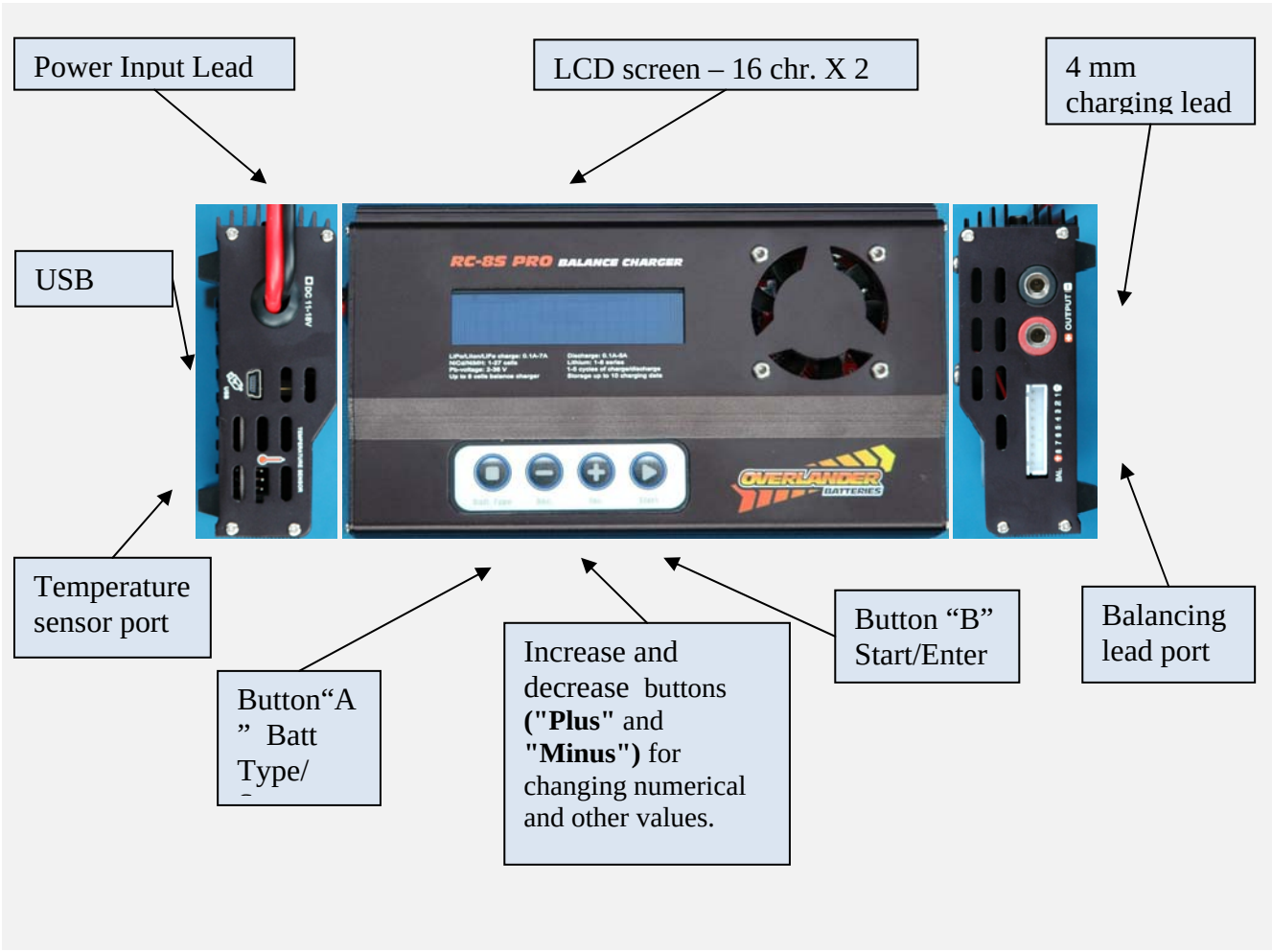
The RC-8S has a USB port which allows connection to a PC. Use of the available software allows the processes of the unit to be observed in graphical form and the data may be stored for future reference.

n.b. the Analysis software and USB cable are available as an optional extra.

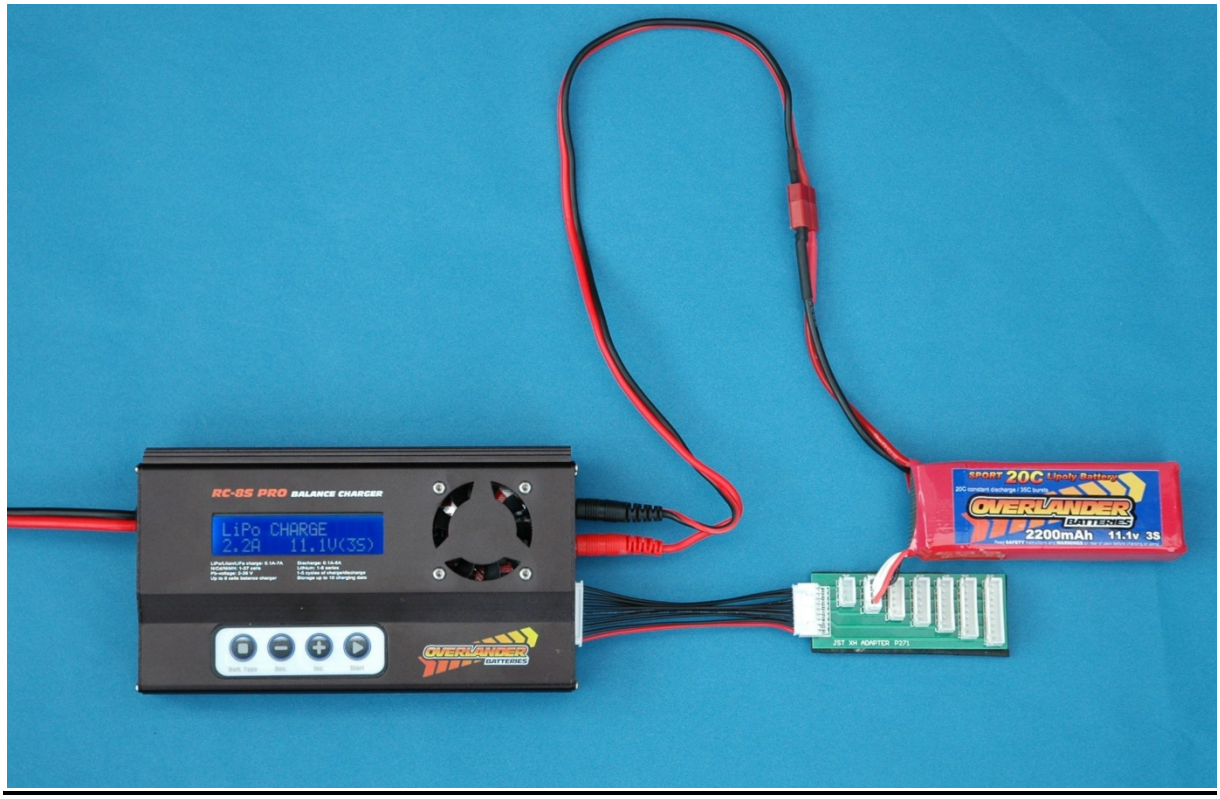
Accessories.

The unit is supplied with a set of five cables complete with an assortment of plugs to facilitate operation with a wide range of different battery types.

Charger Control and Connection Lay-out.


Power Input Lead
LCD screen – 16 chr. X 2
4 mm charging lead
USB
RC-8S PRO BALANCE CHARGER
OVERLANDER BATTERIES
Temperature sensor port
Button"A" Batt Type/
Increase and decrease buttons ("Plus" and "Minus") for changing numerical and other values.
Button "B" Start/Enter
Balancing lead port

LiPo Battery Connection to Charger with Balancing



This photograph shows the correct way to connect the unit to a LiPo battery for any process involving balancing. Both the main battery leads and the balancing lead must be connected.

WARNING!!! Failure to connect in the approved manner may cause damage to the charger and/or the battery.

Warning and Safety notes.

These warnings and safety notes are particularly important. Please follow the instructions carefully to obtain maximum safety. The charger and the battery can otherwise be damaged (at worst it can cause a fire).

- Never leave the charger unattended when it is connected to its power supply. If any malfunction is observed during operation, TERMINATE THE PROCESS AT ONCE and refer to the operation manual.
- Keep the charger well away from dust, damp, rain, heat, direct sunshine and vibration. Never drop it.
- The allowable input voltage is 11-18V DC.

- This charger and the battery being processed should be put on a heat-resistant, non-inflammable and non-conductive surface. Never place them on a car seat, carpet or similar. Keep all inflammable or volatile materials away from the area of operation.
- Care must be taken to avoid any possible restriction to the cooling vents.
- Make sure you know the specifications of the battery to be charged or discharged to ensure it fits the specification of this charger. If the program is set up incorrectly, the battery and charger may be damaged. It can cause fire or explosion due to overcharging. This warranty is not valid for any damage or any damage or subsequent damage arising as a result of a misuse or failure to observe the procedures outlined in this manual.

NiCd / NiMh

Voltage level: 1.2V/cell.
Allowable fast charge current: IC-2C (depends on the cell performance).
Discharge voltage cut-off level: 0.85V\cell (NiCd), 1.0V\cell (NiMH).

LiIo

Voltage level: 3.6V/cell.
Max. charge voltage: 4.1V\cell.
Allowable fast charge current: 1 C or less.
Min. discharge voltage cut-off level: 2.7V/cell or higher.

LiPo

Voltage level: 3.7V/cell.
Max. charge voltage: 4.2V/cell.
Allowable fast charge current: 1 C or less.
Min. discharge voltage cut-off level: 3.0V/cell or higher.

LiFe

Voltage level: 3.3v/cell.
Max. charge voltage: 3.6V/cell.
Allowable fast charge current: 4C or less.
Min discharge voltage cut-off level: 2.0V/cell or higher.

Pb Acid

Voltage level: 2.0V/cell.
Max. charge voltage: 2.46V/cell.
Allowable fast charge current: O.4C or less.
Min discharge voltage cut- off level: 1.75V/cell or higher.

To avoid short circuits between the battery charge leads, always connect the charge cable to the charger first, then connect the battery. Reverse the sequence when disconnecting. Do not connect more than one battery pack to this charger at any time.

Never attempt to charge or discharge battery packs which fit the following classifications.

- A battery pack which consists of different types of cells (including cells from different manufacturers).

- A battery that is already fully charged or just slightly discharged.

- Non-rechargeable batteries (Explosion hazard).
- Batteries that require a different charge technique from NiCd, NiMH, Lipo or Gel cell (Pb, Lead acid).
- A faulty or damaged battery.
- A battery fitted with an integral charge circuit or a protection circuit.
- Batteries installed in a device or which are electrically linked to other components.
- Batteries that are not expressly stated by the manufacturer to be suitable for the currents this charger delivers during the charge process.

Please bear in mind the following points before commencing to charge any battery.

- Did you select the appropriate program suitable for the type of battery you are charging?
- Did you set up adequate current for charging or discharging?
- Have you checked the battery voltage?
- Lithium battery packs can be wired in parallel, and in series, i.e. a 2 cell pack can be 3.7V (in parallel) or 7.4V (in series).
- Have you checked that all connections are firm and secure? Make sure there are no intermittent contacts at any point in the circuit.

Charging

During the charge process, a specific quantity of electrical energy is fed into the battery. The charge quantity is calculated by multiplying charge current by charge time. The maximum permissible charge current varies depending on the battery type or its performance, and can be found in the information by the battery manufacturer. Only batteries that are expressly stated to be capable of quick-charge are allowed to be charged at rates higher than the standard charge current.

Connect the battery to the terminal of the charger: red is positive and black is negative. Due to the different resistance of cable and connector, the charger cannot detect resistance of the battery pack, the essential requirement for the charger to work properly is that the charge lead should be of adequate conductor cross-section, and high quality connectors which are normally gold-plated should be fitted to both ends. Always refer to the battery manufacturers' advice regarding charging methods, recommended charging current, and charging time. Especially so with Lithium batteries, which should only be charged according to the instructions provided by the manufacturer.

Careful attention should be paid to the connection of Lithium batteries. It is essential to remember that the cells in Lithium battery packs can be wired in parallel and in series. In the parallel connection, the battery's capacity is calculated by multiplying a single cell's capacity by the number of cells, and the pack voltage is the same as that of a single cell. In series connection the capacity of the pack is the same as that of a single cell, but the pack voltage is that of a single cell multiplied by the number of cells. Using any Lithium battery with an excessive voltage imbalance between cells may cause damage to the pack with possible fire or explosion. It is recommended that Lithium cells be charged in series packs. **Do not attempt to disassemble any battery pack arbitrarily**

Discharging

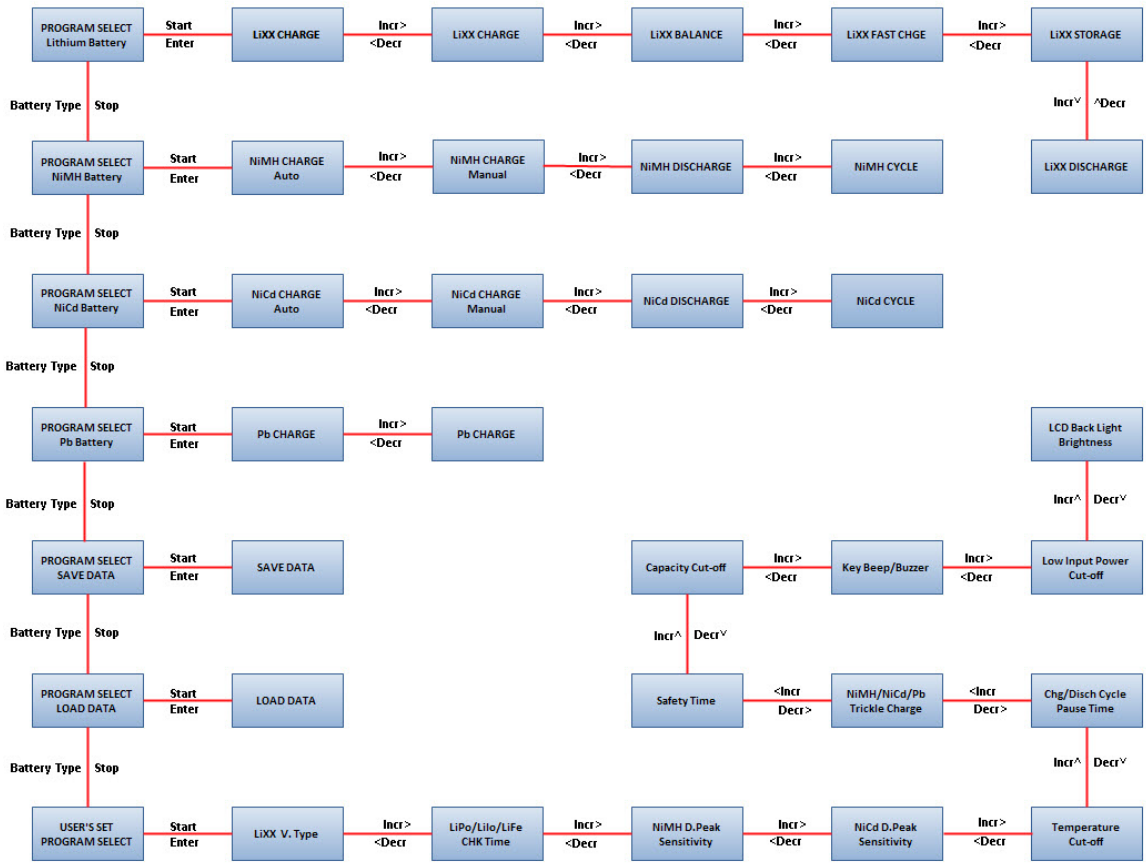
The main purpose of discharging is to clean any residual capacity of the battery, or to reduce the battery voltage to a defined level. The same attention should be paid to the discharging process as to charging. The final discharge voltage should be set up correctly to avoid deep-discharging. Lithium batteries cannot be discharged to lower than the minimum voltage without causing a rapid loss of capacity or a total failure. In general use, a Lithium battery does not need to be discharged. Please pay attention to the minimum voltage of all cells in a Lithium battery to protect and maintain the battery.

Some rechargeable batteries have a memory effect. If they are partly discharged and then recharged they can only accept a lower input capacity. They remember this value and will only accept the same reduced input the next time they are charged, even if fully discharged. This is a 'memory effect'. It is said that NiCd and NiMh batteries suffer from memory effect. The effect is worse with NiCd than with NiMh.

It is recommended that Lithium batteries are only partially discharged (rather than fully discharged) where possible. Frequent full discharging should be avoided as it increases the possibility of damage due to over discharge. It is better to charge a battery more often or to use a battery of larger capacity. The full capacity of any pack should not be used until the pack has been subjected to 10 or more charge/discharge cycles. The cyclic process of charge and discharge will optimize the capacity of battery pack.

These warnings and safety notes are particularly important. Please follow the instructions carefully to obtain maximum safety. The charger and the battery can otherwise be damaged (at worst it can cause a fire).

Programming the RC-8S



General
The initial switch-on of the unit (by connection to a 12 volt battery or mains power supply) will display the unit identification followed immediately by the Program Select screen. In normal use this will indicate the program last in use when the unit was switched off. Programming is achieved by a sequence of pushes on the four buttons with each push causing an audio beep from the unit.
Repeated pressing of button **A** will scroll through the six basic program headings as follows
Lixx battery.
NiMH battery.
NiCd battery.
Pb battery.
Save Data.
Load Data.
User Set Program.
In each case the program is entered by pressing **B** which will move to the initial charge or discharge screen for that type of battery, or to an initial screen for the process chosen. A press of either the **Plus or Minus** buttons will scroll through the available options for that program. These options are as follows:-

NiCd – charge to discharge to cycle.
NiMH – charge to discharge to cycle
LiPo – charge to balance charge to fast charge to storage to discharge
Pb batt. – charge to discharge
Save Data – save data only
Load Data – load data only
User Set Program – LiPo voltage type, to Lithium check time, to NiMH sensitivity, to NiCd sensitivity, to Temperature probe cut-off select and set, to Cyclic Waste time (inter-cycling pause), to Trickle current set, to Safety Timer, to Capacity cut-off, to Key beep/buzzer, to Input power low voltage cut-off, to LCD screen lighting brightness.

Other options exist within certain programs. In the charge programs for NiMH and NiCd packs the choice can be made between Manual and Automatic charging. In the Manual case the user sets a charge current and the unit will hold the charge at that value until the process is complete. In the Automatic case the user sets an upper limit to the charge current but the unit has the facility to charge the pack at a current lower than this limit if it assesses that the pack would benefit from a lower value. If conditions improve, this change may be reversed. The changes in charge current may continue automatically until the process is complete.

Once the required operational screen has been reached, the user can adjust the parameters to suit his requirements. This process is generally achieved by pressing button **B** which causes the parameters to flash and then allowing the value to change by pressing the **Plus or Minus** buttons. Once a particular parameter has been set, further presses on **B** will move through the remaining parameters allowing each to be adjusted in turn. When the final value has been set a last press of **B** will complete the process. At this stage the battery may be connected to the unit and the button **B** pressed to start the procedure which will then continue automatically until complete. The unit signals completion by a series of audio beeps.

In the case of the User Set program parameters the data needs more detailed explanation.

LiPo voltage type. There are three kinds of Lithium battery: LiFe (3.3V), Lilo (3.6V) or LiPo (3.7V). This information is of critical importance such that you have to check the battery carefully to make sure the value chosen is correct. If it is incorrect, the battery may be damaged leading to a possible fire.

Lithium check time. To help the user avoid erroneous settings, the RC-6S detects the cell count of Lithium packs automatically at the beginning of charge or discharge process. This process is not infallible and the user is recommended to set the correct cell count manually. An additional check is made by the unit during the process, normally 15 seconds after the start. This period can be adjusted (e.g. increased for large capacity packs), but care should be taken not to extend it for smaller packs.

NiMH and NiCd sensitivity. The automatic delta peak cut-off for these cells is set by default to 7 mV per cell for NiMH and 12 mV per cell for NiCd. These values can be adjusted between 5 and 20 mV per cell but setting the trigger voltage higher brings a danger of overcharging; whereas setting it lower brings a possibility of premature termination. Please refer to the technical specification of the battery.

Temperature cut-off. If the optional thermal probe is used then this feature allows it to be switched on or off and sets the critical temperature.

Cyclic Waste Time. The use of a cyclic program can cause the pack to overheat as the each stage follows the previous one. The program will minimize this effect by inserting a time delay (or pause) after each stage to allow the battery enough time to cool down before beginning the next stage in the process. This value ranges from 1 to 60 minutes and can be adjusted to suit different sizes of cells.

Trickle current. The use of a trickle charge can be useful in some cases and this feature allows the value of this current in mA to be set.

Safety Timer. The unit contains an integrated safety timer which starts simultaneously with any charge process. If an error leads to a failure of the automatic fully charged cut-off this timer will cut-off the charge at the time limit set and prevent battery damage. The calculation of the time limit depends on the charging parameters set and an example is now given.

Safe timer calculation.

When charging NiCd /NiMH batteries, divide the capacity by the current, and then divide the result by 11.9. Set this number of minutes as the safety timer value. If the charging process is stopped at this time threshold, about 140% of the capacity has been fed into the battery.

Example calculations

Capacity	Current	Safety Time
2000mAh	2.OA	(2000/2.0=1000)/11.9 = 84 minutes
3300mAh	3.OA	(3300/3.0=1100)/11.9 = 92 minutes
1000mAh	1.2A	(1000/1.2=833)/11.9 = 70 minutes

Capacity Cut-off. The feature provides a final level of protection against over-charging. If the delta-peak voltage cannot be detected or the safety timer setting is excessive, this value will automatically stop the charge process when the battery reaches the user-set maximum charge capacity. This might normally be set at 130% of the manufacturers' specified value.

Key Beep/Buzzer. The audio beep to confirm the user's operation sounds every time a button is pressed. The buzzer or melody sounds at various times during operations to confirm a mode change. These functions can be switched on or off.

Input Power Low Voltage Cut-off. This function monitors the voltage of the input battery used to power the unit. If the voltage falls below the user-set value, the program will be ended to protect the input battery.

LCD Screen Brightness. This function allows the screen brightness to be adjusted for maximum user comfort and clarity.

Normal charge and discharge programs.

Charging NiCd and NiMH packs.
Connect charger and wait for first screen to settle (depending on previous programme used).
Press **A** button repeatedly until you reach the cell type (NiMH or NiCd).
Press **B** button to enter the charge set up screen.
Press **B** button again and amps will flash.
Press **Plus** or **Minus** buttons to set the current to your chosen value.
Press the **Plus** and **Minus** buttons simultaneously to select between Automatic (current limit) and Manual (fixed current) modes.
Press **B** to stop current flashing.

Connect the battery and press button **B** for about 3 seconds until the charge process commences. The process will continue automatically until complete when the unit will give an audio signal.

Discharging NiCd and NiMH packs.
Connect charger and wait for first screen to settle (depending on previous programme used).
Press **A** button repeatedly until you reach the cell type (NiMH or NiCd).
Press **B** button to enter the charge set up screen.
Press **Plus** button to move to the Discharge screen.
Press **B** button and the amps will flash.
Press **Plus** or **Minus** buttons to set the current to your chosen value.
Press **B** button and the volts will flash.
Press **Plus** or **Minus** buttons to set the voltage to your chosen value.
Press **Plus** or **Minus** to set the cut-off voltage (e.g. 1 volt per cell =5 volts for a 5 cell pack.)
Press **B** button to stop voltage flashing.
Connect the battery and press button **B** for about 3 seconds until the discharge process commences. The process will continue automatically until complete when the unit will give an audio signal.

Cyclic operation for NiCd and NiMH packs.
Connect charger and wait for first screen to settle (depending on previous programme used).
Press **A** button repeatedly until you reach the cell type (NiMH or NiCd etc.).
Press **B** button to enter the charge set up screen.
Press **B** button again and amps will flash.
Press **Plus** or **Minus** buttons to set the current to your chosen value.
Press the **Plus** and **Minus** buttons simultaneously to select between Automatic (current limit) and Manual (fixed current) modes.
Press **B** to stop current flashing.
Press **Plus** button to move to the Discharge screen.
Press **B** and the amps will flash.
Press **Plus** or **Minus** to set discharge current.
Press **B** and the volts will flash.
Press **Plus** or **Minus** to set the cut-off voltage (e.g. 1 volt per cell =5 volts for a 5 cell pack.)
Press **B** to stop voltage flashing.
Press **Plus** button to move to the cycling screen.
Press **B** to get Chg/Dchg flashing and then **Plus or Minus** to set the order you want (Chg/Dchg or Dchg/Chg).
Press **B** to get cycle nos. flashing and **Plus or Minus** to set cycles you want (1 to 5).

Press **B** to stop cycle no. flashing.
Connect battery you want to cycle.
Press **B** and hold (around 3 secs) to begin cycle.
Process is then automatic until completion.

Lithium packs –LiPo/LiIo/LiFe.
These programs are only suitable for charging/discharging Lithium based batteries with a nominal voltage of 3.3/3.6/3.7V/cell. Different batteries have different chemistries and therefore need different charge techniques. The charge current varies according to battery capacity and specification. The final voltage is very important; it should precisely match the specified voltage of the battery: LiPo is 4.2V, LiIo is 4.1V, and LiFe is 3.6V. The current and voltage of the battery should be correctly set.
As with all programs on the unit, to change the values of parameters, press **B** to make the parameter flash, use **Plus or Minus** to change the value, then press **B** button again to store the value. A particular difference for all Lithium procedures is that the start of the procedure includes an option to cancel the process. When the **B** button is pressed for about 3 seconds the process does not start immediately but the screen alternates between Cancel (stop) and Confirm (enter). The **B** button needs to be pressed again whilst the Confirm (enter) message is on the screen and this will start the procedure.

Charging Lithium packs – LiPo/LiIo/LiFe.
Connect charger and wait for first screen to settle (depending on previous programme used).
The procedure must be commenced by using the **User Set Program** to select either LiPo, LiIo, or LiFe. Once this is complete the details of the program change to cover the Program Select name and the nominal/maximum/minimum voltages involved. The charging procedure is then the same for all three types.
There are three charge programs available.
Press **A** button repeatedly until you reach the cell type (LiPo, LiIo, or LiFe as chosen above).
Press **B** button to enter the charge set-up screen.
Press **Plus or Minus** button to scroll around the five programs, choosing from the following three:-
Charge – a basic charge process without balancing.
Balance – a much better process involving both the charging of the pack and the active balancing of the individual cells.
Fast – a process designed to allow charge rates at above 1C with the current reducing towards the end of the charge. This process reduces the charging time but also slightly reduces the final capacity of the pack. It may also reduce the cyclic life of the pack.
Press **B** button and the amps will flash.
Press **Plus or Minus** button to set the current to your chosen value.
Press **B** button again and the voltage (cell count) will flash.
Press **Plus or Minus** button to set the voltage to your chosen value.
Press **B** button to stop the voltage flashing.
Connect the battery and press **B** button for about 3 seconds which causes the screen to alternate between Cancel (stop) and Confirm (enter). The **B** button needs to be pressed again whilst the Confirm (enter) message is on the screen and this will start the procedure. The process will continue automatically until complete when the unit will give an audio signal.

Discharging Lithium packs – LiPo/LiIo/LiFe.
This program is the reverse of the previous charge procedure. Connect charger and wait for first screen to settle (depending on previous programme used). The type of Lithium battery must again be selected in the **User Set Program** before starting the programming.

Press **A** button repeatedly until you reach the cell type (LiPo, LiIo, or LiFe as chosen above).
Press **B** button to enter the charge set-up screen.
Press **Plus or Minus** button to scroll around the five programs, choosing from the following two:-
Discharge – a basic discharge program.
Storage – a program intended to prepare nearly full batteries for storage by discharging them down to a mid-range voltage which is ideal for shelf storage over weeks and months.
Press **B** button and the amps will flash.
Press **Plus or Minus** button to set the current to your chosen value.
Press **B** button again and the voltage (cell count) will flash.
Press **Plus or Minus** button to set the voltage to your chosen value.
Press **B** button to stop the voltage flashing.
Connect the battery and press **B** button for about 3 seconds which causes the screen to alternate between Cancel (stop) and Confirm (enter). The **B** button needs to be pressed again whilst the Confirm (enter) message is on the screen and this will start the procedure. The process will continue automatically until complete when the unit will give an audio signal.
The preparation of a pack for storage may also be achieved by charging up to the required intermediate voltage (if the pack is largely discharged before preparing it for storage).The procedure uses a similar pattern to that above.

Pb batteries (Lead Acid/Gel)
These programs are only suitable for lead based batteries with a nominal voltage of between 2 and 36V (based on 2v per cell). These batteries can only deliver low current in comparison to their capacity, and a similar restriction applies to their charging rate where the optimum is $1/10^{th}$ of their capacity. Please follow the instructions of the manufacturer.

Charging Pb batteries.
Connect charger and wait for first screen to settle (depending on previous programme used).
Press **A** button repeatedly until you reach the cell type (Pb Batt).
Press **B** button to enter the charge set up screen.
Press **B** button again and amps will flash.
Press **Plus** or **Minus** buttons to set the current to your chosen value.
Press **B** again and the volts will flash.
Press **Plus** or **Minus** buttons to set the voltage to match the correct number of cells in the battery.
Connect the battery and press button **B** for about 3 seconds until the charge process commences. The process will continue automatically until complete when the unit will give an audio signal.

Discharging Pb batteries.
Connect charger and wait for first screen to settle (depending on previous programme used).
Press **A** button repeatedly until you reach the cell type (Pb Batt).
Press **B** button to enter the charge set up screen.
Press the **Plus** button which will enter the discharge screen.
Press **B** button again and amps will flash.
Press **Plus** or **Minus** buttons to set the current to your chosen value.
Press **B** again and the volts will flash.
Press **Plus** or **Minus** buttons to set the voltage to match the correct number of cells in the battery.

Connect the battery and press button **B** for about 3 seconds until the discharge process commences. The process will continue automatically until complete when the unit will give an audio signal.

Storing and loading data.

This process allows you to set up the programs you use most often (up to 10 programs) for particular packs and store the program data so that anytime you wish to use one of them you simply load the program from the memory and don't need to set it up from scratch.

Start in program select and press the **A** button repeatedly until you reach Save Data.
Press the **B** button and you reach the entry screen with Program number, and Cell type, pack nominal voltage (e.g. 12.0 V for 10 NiMH cells), and cell capacity of the battery being programmed.
Set each value in turn using the **Plus or Minus** buttons then moving to the next one by pressing the **B** button.
When all your values are OK, press and hold the **B** button for 3 secs to move to the next screen.
Set the type of program you want to save by using the **Plus or Minus** buttons to scroll between charge/discharge/cycle and select your choice. Once you have chosen the type you can enter the details as follows.

1) For a Charging program - You can set the charge process to be automatic (At) or manual (Man) by using the **B** button to make the current flash and then pressing the **Plus and Minus** buttons simultaneously. This will change the screen between At/current limit and Man/current.
With the current still flashing you can alter the current limit (or current) to the value you wish by using the **Plus or Minus** button.
Press and hold the **B** button to save this charge program.
2) For a Discharge program - Press the **B** button to cause the current to flash and then the **Plus or Minus** buttons will set this to your chosen value. Use the same process for the cut-off voltage.
Press and hold the **B** button to save this discharge program.
3) For a cyclic program you first use the **B** button to make the disch/chg flash, and then the **Plus or Minus** buttons to choose the order of the two phases of the cycle. Next press of the **B** button makes the number of cycles flash and this can be set between 1 to 5 cycles. Press the **B** button again to leave only the asterisk flashing and press the **Plus or Minus** buttons to move to a charge and then a discharge screen which are set up exactly as in 1) and 2) above. Press and hold the **B** button for 3 seconds and the program will be saved.

To load an established programme on to the unit simply scroll through the program select screen to reach Load Data then press the **B** button. Use the **Plus or Minus** buttons the reach the program number you wish to use, then press and hold the **B** button for 3 seconds until the program has loaded. Use the **Plus or Minus** buttons to scroll to cycle. Connect the battery and start the program (hold **B** for 3 seconds) exactly as if you had just set it up from scratch.

In the case of a cyclic program you can use it as programmed (i.e. the take the pack through say 5 cycles of charge-discharge at your selected parameters) or you can use it to carry out only the charge or the discharge programs built into the cyclic pattern. To do this you enter the program number as above and then use the **Plus or Minus** buttons to scroll between charge, discharge and cycle. If you stop at charge or discharge and connect the pack before

holding **B** for 3 seconds, the unit will simply carry out a charge (or discharge) and not continue on to the full cycle.
This shows that you can effectively store 3 separate programs in each cyclic program (charge only, discharge only, and full cycle) meaning that the total number of programs available is effectively 30.

One additional feature is that a saved program can be adjusted temporarily. Once the program has been loaded into the unit any of the parameters can be changed before using the program (e.g. the charge current could be reduced). After the program has been used it can be re-saved in the modified form or it can be left without saving in which case the original program remains in the memory and future loading will produce the original, un-modified, version.

Monitoring values during a procedure.
Once any charge/discharge process has commenced, the screen shows a set of real-time data for that procedure. This data will usually include the battery type, the charging/discharging current, and the pack voltage. It may also show the process (charge/discharge/balance/cycle etc.), the elapsed time from start, and the discharged/charged capacity.
In the case of the discharge/storage of Lithium batteries the connection of the balance lead to the unit will allow the individual cell voltages to be monitored. To view these values during discharge the **Plus** button can be pressed at any time to display 6 active cell voltages (for a 6S pack, for less than 6S some of the voltage readings will show 0.00).

Additional data can be obtained during any process by pressing the **Minus** button. This changes the screen into the **User Set** screen and displays the various categories by scrolling downwards with further presses of the **Minus** button. A press of the **Plus** button will return to the normal on-going process screen.

Error and Warning Signals.

The following screen wordings indicate a problem as listed below:-

REVERSE POLARITY	Battery connection reversed.
CONNECTION BREAK	A break in the cables/connectors between pack and unit
SHORT ERR	Short circuit on the output.
INPUT VOL ERR	Incorrect voltage selection (cell count) for Lithium pack.
VOL SELECT ERR	Voltage of battery pack incorrect.
BREAK DOWN	The unit has a malfunction. Seek expert advice.
BATTERY CHECK LOW VOLTAGE	The voltage is lower than the set value. Check cell count.
BATTERY CHECK HIGH VOLTAGE	The voltage is higher than the set value. Check cell count.
BATTERY VOLTAGE	The voltage of one cell in the pack is too low.

CELL LOW VOL	Check all cells.
BATTERY VOLTAGE CELL HIGH VOL	The voltage of one cell in the pack is too high. Check all cells.
BATTERY VOL ERR CELL CONNECT	Incorrect connection detected. Check whole circuit.
TEMP OVER ERR	The unit internal temperature is too high. Allow unit to cool.
CONTROL FAILURE	The processor has detected a supply failure. Check supply and circuit.

Warranty and Service.

We guarantee this product to be free from manufacturing and assembly defects for a period of one year from the date of purchase. This warranty only applies to material or operational defects which were present at the time of purchase. During the period of the warranty we will repair or replace free of charge components deemed defective as described.

You will be required to produce proof of purchase (invoice or receipt). This warranty is not valid for any direct or indirect damage arising as a result of misuse, modification, or failure to observe the procedures outlined in this manual.

Overlander Batteries

Tel: 01524 793328
Fax: 01524 793327
Website:http://www.overlander.co.uk

Unit 1, Jesmond Dene Trading Est.
School Lane
FORTON
Lancashire
PR3 0AT
UK